N.A.C.A. BULLETIN

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EDITORIAL DEPARTMENT NOTE

Economical utilization of direct and indirect man hours becomes one of the principal fronts on which the cost control battle is being waged while material prices and pay rates remain unyielding or continue to bulge. The author of the first article in this issue believes that cost control can be effectively extended to practically all company operations if a thoroughgoing and systematic program is adopted which, among other things, establishes a continuous relationship between labor actually performed and manufacturing processes approved on an engineering basis.

The article is written by WALTER E. ANDERSON, Chief of Industrial Engineering, Federal Telephone and Radio Corp., Clifton, N. J., who has had extensive experience on the staff of industrial engineering firms and with individual companies. He was formerly connected with Day & Zimmerman, Philadelphia, Pa., and W. H. Leffingwell, Inc., New York, N. Y. Among positions held with industrial companies were Assistant Plant Manager, Socony Burner Corp.; Plant Manager, Pioneer Instrument Co.; and Chief Industrial Engineer, Atwater Kent Mfg. Co.

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Descriptions of standard cost applications make interesting reading if only for the devices and departures incorporated in particular systems to meet the conditions of an individual company or of its industry. Our second article is a well-rounded exposition of standard cost procedures in force in a company manufacturing silver flatware and hollowware. These procedures represent the results of evolutionary changes in the company's operation of the system since its inception a good many years ago.

The author, JOHN F. MICKELSON, has been Chief Accountant of the International Silver Co., Meriden, Conn., since 1942. Mr. Mickelson, who is a Certified Public Accountant of New York, went with his present company after fifteen years on the New York staff of Price, Waterhouse & Co.

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When the data yielded by an actual cost system are subjected to effective analysis and a budgeting process which takes corrective factors and future operating conditions into consideration, the results may include a degree of planning and current control closely resembling the comparable results of a standard cost system. This issue concludes with an article disclosing the procedures relied on for control of costs in a company of substantial size which applies cost on an order basis. It is contended that, in this instance, the introduction of unit standards and incorporation of standard cost data in the accounts might well vitiate results obtained from historical cost information.

J. C. FREEMAN, General Works Accountant, Allis-Chalmers Mfg. Co., Milwaukee, Wis., is the author of the presentation which relates to the accounting methods in operation at his company.

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DECEMBER 15, 1947

ACHIEVING CONTROL OF DIRECT AND INDIRECT LABOR COSTS

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EFFECTIVE CONTROL over production costs is a requirement of progressive management in any kind of manufacturing endeavor. It is an economic necessity for a company whose products are sold in a competitive market. These facts are currently being recognized in industry and much attention is now directed to ways and means by which such control may be satisfactorily accomplished.

Manufacturing cost control, in its full sense, embraces a control of all items of cost entailed in producing a product. Some of these items are more susceptible than others to a control by the operating organization. The outstanding opportunity in this respect rests within the important portion of cost that is paid through payroll disbursements. It is in this branch of expenditure that excesses are usually hidden and become barriers to low cost production. Because of the broad opportunity for betterment through a control of payroll cost, this area has been chosen for examination and study.

Coordinated Operations a Prerequisite

In a system of cost control, the cost section of the accounting department has many important functions to perform. Among these are the accurate and systematic accumulation of costs, the allocation of such costs to their proper sources, and the issuance of comprehensive reports that show what is actually taking place in the cost picture. Proper performance of these functions will require the transmittal of accurate operating information to the cost section. In this the accounting department must be given the active support and cooperation of the operating departments.

On the basis of reported cost findings, management must take intelligent action where expenditures are excessive for the production value received. Achievement in this is dependent upon a joint endeavor on the part of the entire manufacturing organization. Each branch of the organization must assume its responsi-

bility for the proper performance of related functions. For example, the product must be properly engineered for manufacturing, materials must be supplied when needed, production equipment must be maintained in good working order, adequate tools must be supplied and serviced, production must be planned and scheduled, and the producing departments must be efficiently managed.

There are no known substitutes for these actions in the accomplishment of effective control. It can not be had simply by imposing stringent and arbitrary economies upon the operating departments in an attempt to control costs at a minimum with no prior knowledge of what that minimum should be. Efforts to control costs in such a manner usually fail to produce any worth-while result. They merely mislead management to believe that costs are being held to the barest minimum.

Basing Control on Operating Standards

A logical and practicable plan for a control of payroll costs should be based upon (1) factual data as to manufacturing processes, (2) operating standards for measuring direct and indirect production activities, and (3) capable and resourceful direction of manufacture so that anticipated results will be accomplished for a given cost expenditure.

Essential factors in the fulfillment of these requirements are:

1. Standard process data.
2. Direct operation standards.
3. Indirect operating standards.
4. Determination of variances allowable.
5. The control budget.

The accumulation of manufacturing data and the establishment of applicable operating standards will involve varying amounts of preparatory work for different kinds of manufacture. Straight process manufacturing of a simple product, where the bulk of production is handled by special purpose machinery, requires the accumulation of only a small amount of process data and relatively few operating standards. A greater amount of preparation is necessary when a company manufactures a complicated mechanism or a number of different mechanical devices. We will assume this to be the problem in our treatment of the factors listed.

Standard Process Data

Preparation of standard process data requires an accurate recording of all the direct labor operations which must be performed to manufacture completely the product or products of a company. Assuming that the products are composed of numerous piece parts and subassemblies, these should be identified by distinguishing part numbers or drawing numbers. In the recording of standard process data, each part number should be treated separately and the individual operations necessary to complete the part should be numbered and listed in the sequence in which they are to be performed in the manufacturing process. This listing should be made on a suitable form known as a process sheet.

In the case of a piece part, the operations so recorded should be those required to transform the specific raw material into a finished part ready to be combined with other parts in a subassembly or a major assembly. For subassemblies and final assemblies, the process sheet for each part numbered assembly should show, in order, the operations required to bring the assembly to the point of further use or to the final status of a completed product, as the case may be.

An important requirement to be observed in the writing of a process sheet is that the listed operations represent the most efficient process by which the unit may be produced with the tools and equipment available or that are to be made available. Also, the process sheet should record only operations determined to be necessary. It should be understood that a primary requirement of cost control is an effective control of the work to be performed. This is facilitated by the recording of a standard process which excludes the possibility of alternate processes being used to suit the convenience of individuals in an inadequately planned program of production.

Reflecting Process Changes Currently

When process sheets have been written for all piece parts and assemblies contained in the products manufactured, a complete recording of every direct labor operation involved in production will then exist. Such a fund of production data will provide the groundwork upon which to build a structure of cost standards. However, before proceeding with that phase of the work, it is well to understand that the initial preparation of process sheets does not mean that the recording of standard process has been completed

once and for all. There is no such thing as finality in this work. Process sheets must be kept up to date with improvements in processes and with other developments that warrant process changes.

Any failure to adjust the written process to conform with acceptable change will tend to foster within the operating departments a disregard for the authority of the process sheet as the standard of manufacturing procedure. If this happens, it will invite deviations of such proportions that effective control will be impossible. Therefore, when a particular process change is considered to be advisable and is approved for production, that change should be recorded on the appropriate process sheet. Prompt and systematic attention to this matter will entail much less work than if it is allowed to lag until it creates costly confusion.

Direct Operation Standards

With the satisfactory completion of standard process information, there follows the work of determining the amount of direct labor required in production. This does not mean an accumulation of the total labor requirement for the production of a completed product. Knowledge of such a sum is required in the costing of a product, but for purposes of cost control we are interested in a breakdown of cost into its various elements. Therefore, we must know the standard amount of direct labor required for the performance of each individual operation prescribed on process sheets. It is through the control of these elements of cost that a cost control is obtained for an entire product.

The determination of direct labor standards for individual operations should be accomplished by careful and thorough time study analyses. Inasmuch as these operational labor standards are to be used for measuring the actual productive performance of the operating departments, they should represent production quotas which may reasonably be attained by production personnel. Standards that are developed by estimate or from records of past production are not sufficiently accurate for this purpose.

Inclusion of All Work Elements

An operation standard should embody all the work elements of the direct operation, including any servicing of the operation which must necessarily be done by the production operator to maintain continuous and standard production. Initial job setup, major changes in tooling, or elements of work which are caused by faulty

job conditions should be excluded from labor standards of productive operations. These are variable factors which, as will be indicated later, should be controlled in another manner and separately from the direct labor standard.

Direct labor standards should be tied in with the established and recorded standard processes reflected on the process sheets. Each labor standard should be identified by its respective part number and operation number so that it may be readily and correctly applied by the cost department and by the manufacturing departments. The use of operation numbers greatly facilitates this application, minimizing the need for technical operating knowledge on the part of clerical personnel and avoiding the many errors that occur when operation names must be interpreted and compared with process sheet descriptions each time the operation standard is applied.

Indirect Operating Standards

The items of cost to be considered under this heading are those that necessitate payroll expenditures for required indirect functions incidental to production. These include the numerous activities that are of service to production throughout the entire cycle from the receipt of raw materials to shipment of finished products. In order to bring these functions within the scope of sound financial control, it is necessary to evaluate them in terms of work to be done and to assign to each on that basis a proper amount of payroll allowance.

The establishment of operating standards for this phase of cost control requires a different approach than in the case of direct labor operations. Some of the standards must necessarily be determined empirically by a competent person experienced in industrial organizing. Standards for the more routine elements of work may then be satisfactorily arrived at by analytical observation and study. While indirect standards should be carefully determined, they need not be so exacting as those of productive operations except in cases where the standards are to be used as a basis for incentive payment.

For cost control, there should be developed a reasonably economical ratio between direct and indirect payroll costs. If an examination of these discloses an excessive ratio of indirect to direct payroll, a thorough investigation of indirect activities should follow with a view to reorganizing the functions on a more economical

basis. Organizational improvements developed by such investigation should be reflected in established indirect labor standards. These standards should be stated monetarily and be composed of a base amount plus a variable increment of cost for different levels of production.

Classification of Variances

Theoretically the productive departments should be capable of producing the products within quality requirements and in exact accordance with written process sheets, incurring no extra operations and no excess cost. However, from a practical standpoint, things do not work out so perfectly in the manufacture of most products. Adverse conditions or circumstances are ever present, tending to raise actual cost above the predetermined standard. Such difference between actual and standard is termed "cost variance."

Conditions which cause variances are so numerous that it would be too cumbersome to utilize an allowance for each condition. The procedure, therefore, is to treat with the effect rather than the cause, and to obtain several groupings of variance costs under headings which reflect the "reasons for variance." In most industries and under ordinary circumstances, there will appear such reasons for variance as (1) substandard productivity, (2) productive time lost, (3) extra operations, (4) rework operations, and (5) replacement or scrap.

Determination of Variances Allowable

In recognition of manufacturing contingencies, an allowable variance in cost should be established for each accepted reason for variance, thereby setting the limit beyond which the actual cost should not exceed the direct labor standard. An accurate determination of such allowables involves considerable study and analysis of plant operations. In this the emphasis should be placed upon thorough investigation of the many causes for each stated reason for variance.

For example, substandard productivity may rest entirely with the direct worker, or it may be caused by defective equipment, tools, materials, or other irregularities. Productive time lost may be caused by a machine breakdown, delayed delivery of materials, waiting for job assignment, or other interferences with the full time productivity of the direct worker. Similarly, each of the re-

maining reasons for variance will be found to stem from a series of causes.

Some of the enumerated conditions are entirely avoidable, while others may be found by analysis to be partly avoidable. Any source of excess cost which may feasibly be removed by the exercise of a normal amount of resourcefulness and initiative on the part of management personnel should be classed as avoidable. Likewise, most of the problems that arise from poor coordination among the various branches of the production organization should be considered remediable.

If the investigator undertaking this evaluation is equipped with a good working knowledge of plant operation and an understanding of human capacities and limitations, he should have no serious difficulty in determining which operating faults are avoidable. By the same token he should be capable of segregating the limited portion of those conditions which are sufficiently unavoidable to be classed as justifiable reasons for variance. On the basis of such practical observations, he should then establish an allowance for each variance reason.

In most instances it will be found that the occurrence of acceptable nonstandard conditions will bear a fixed relation to plant activity and to the direct payroll dollar. Exceptions to this rule will be evident at times when new products are introduced into production or when attempts are being made to step up plant production without a well-planned program for such accomplishment. During any transition period, the effect of such changes upon standard cost should be taken into consideration when determining variance allowables.

The Control Budget

Through a proper application of the principles explained in our discussion of the foregoing factors, a prior knowledge will be obtained of the elements of labor cost required to produce a given product under a controlled manufacturing situation. Our next interest is to provide a guide toward the realization of a controlled situation. Such guidance is obtained through the control budget. Supporting materials for the budget are the indirect operating standards and the established allowables for variance.

A purpose of the budget is to make known the amount of payroll cost authorized for each phase of plant activity at the pre-

vailing level of production. It is possible to omit the standard portion of direct labor from the control budget with the understanding that production will be charged with direct labor at standard cost only and any variance thrown out for separate control within the variance allowables specified by the budget.

A separate budget should be drawn up for each productive department and for each functional branch of the organization that contributes services to production. The budget should describe the budgetary items applicable to a department and should show the amount of payroll expenditure authorized to cover each item for the budget period. This period should coincide with that of the direct payroll.

Reports to Department Heads

Department heads should receive cost information in the form of budget reports issued at the close of each budget period. These reports should show the standard and the actual amounts of expenditures for each item during the period with cumulative totals against each for the fiscal year to date. Reports transmitted in this manner will inform responsible individuals of the cost status of their departments and will indicate wherein the departments are performing to standard and at what points improvement may be needed in order to meet requirements of the budget.

When the products of a company are made of many piece parts, requiring a wide variety and combination of operations in their manufacture, adequate control of production processes and costs are likely to be neglected. Various reasons might be given for such neglect and each might seem to be valid under certain circumstances. Some of these reasons are founded on a belief that the details of manufacture are too voluminous to reduce to operating standards. Others arise from a fear that a system of control would create excessive clerical requirements and cause additional unwarranted costs.

Complete Control Attainable

Whether certain kinds of products are too complicated and their manufacture too involved for control can be best answered by a statement of fact, that is, the more persistently a type of product or manufacturing situation defies the application of controls, the more urgently are those controls needed. In other words, the greater the ramifications of production and control problems,

the greater are the benefits to be derived by bringing them under the influence of effective control.

When the matter is approached with a keen sense of the economic advantages of control and with a full knowledge of organizational functions and their effective coordination, no ground will exist for apprehension. Often the recorded manufacturing data developed for control purposes are found to fill many other long-felt needs. Furthermore, the operation of an enterprise under a sensibly controlled situation will result in a lower rather than a higher over-all cost of doing business.

Another trend of thought about controls is prevalent in some levels of management, particularly in the operating departments. There are those who are of the opinion that industry is troubled with so many problems that it is virtually impossible to exert complete and effective control over all productive and contributing functions. This feeling among subordinate executives is doing much to weaken the cost conserving efforts of top management.

Assuredly there are many trying problems besetting management these days and there are difficulties in the path of obtaining efficient over-all plant operation, but these should not be looked upon as matters beyond executive control. They should be viewed as signifying the need for organizing the facilities of management to cope with current problems. In this respect, the use of proven techniques coupled with a firm will to achieve will place complete control within the reach of any progressive manufacturing organization.

COMING ARTICLES

In the *N. A. C. A. Bulletin*, January 1, 1948

Cost and Financial Tests for the Veteran's Business Adventure
by Percy L. Procter

A Company Training Program for Accounting Personnel
by James R. Evans

Making Industrial Accounting Real to the Student
by George W. Lafferty

POINTS OF VIEW

The break-even point may be considered a danger light. The warning afforded as it is approached must be heeded by management if the business is not to go on the shoals of low volume. (*Joseph Goliger, Milwaukee*)

* * *

With present high material costs and lowered productivity, it would be possible for a concern to price itself out of the market before attaining a normal profit. (E. M. Newton, Waterloo)

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The impression that large nonrecurring charges or credits distort income for the current period is not always correct. It has been found in a great many cases that these items are properly applicable to the current period. (*William R. Pole, Washington*)

* * *

Averages are used quite frequently in our everyday work and we are apt to rely on them more than is warranted. They should be used merely to show trends. Their limitations should be understood. (Raymond C. Boehmke, Buffalo)

* * *

It frequently happens that an improved personnel would get the desired results at only a fraction of the cost of new equipment. (*G. P. Nelson, Muskegon*)

* * *

Anyone doing a perfect job in the control of manufacturing costs only is doing no more than about forty per cent of his complete job. It has been estimated that the cost or expense dollar includes nearly sixty cents for distribution costs. (John B. Townsend, Grand Rapids)

* * *

One accountant advanced the opinion that it did not matter whether or not standard costs were tied in to the general books or kept separately. I have noticed this trend. (*E. J. Gaither, Piedmont*)

STANDARD COSTS APPLIED TO THE MANUFACTURE OF SILVERWARE

by JOHN F. MICKELSON, Chief Accountant,

The International Silver Co.,
Meriden, Conn.

THE PRINCIPLES underlying a standard cost system are today fairly well defined and understood. All standard cost systems follow the same basic pattern and are designed to serve the same general purposes—control of costs, valuation of inventories and cost of sales, determination of selling prices, and preparation of budgets and forecasts. The variety in standard cost systems that will be found in actual use, however, is infinite. Each one must be elaborated, condensed, modified or refined to meet actual conditions in each industry and each corporate organization. The standard cost system in use at The International Silver Company is no exception. Although standard costs were originally installed and used by the company as far back as 1919, the system in use today would not be recognized by its original sponsors. It has been radically changed and improved over the years to meet changing conditions in the company's operations and to reflect advances in accounting technique and methods of control.

Products and Processes

Before discussing the details of the system, it is well to give briefly a picture of the company's operations as a background for better understanding. The International Silver Company manufactures plated and sterling tableware. This includes flatware—knives, forks, and spoons—and hollowware consisting of items such as tea pots, trays, vegetable dishes, candelabra, etc. There are nine fabricating plants each devoted to some particular line or grade of product, and in addition a rolling mill which manufactures the nickel silver and sterling sheets, blanks, and circles which are the basic raw materials of the fabricating plants. Some plants manufacture partially completed products for finishing in other plants. Others make and finish complete the product they ship. In normal times the company produces perhaps some 15,000 different articles classified into about sixty lines. Since the war, production has been concentrated on a much smaller number of patterns and items, principally because the backlog of orders built

up during the war has forced us to produce only the more essential items of tableware.

The principal manufacturing processes involved in making flatware are more or less standardized and considerably more mechanized than those used in making hollowware, although of course they vary in details, depending on the quality of the product. Flatware is produced for stock and in much greater quantities than hollowware which frequently, although not usually, is made to special order. In making flatware the sheet stock is first cut into blanks, which are rolled to length, width, and thickness, cut out to form the article and pattern outline, struck with the pattern design, and shaped. These operations are followed in turn by trimming, sand buffing, ragwheeling, plating, compound buffing and packing. For convenience the manufacturing process is interrupted before plating, and the work in process, known as "metal stock" or product finished in metal, is stocked awaiting production orders to finish. In making plated or sterling hollowware the variety of items prohibits much standardization and since the quantities produced are comparatively small and relatively complex, there is considerably more hand work.

Accounting Setup

The company has at the present time some 6,000 factory employees. Each factory does its own shipping and billing, has its own payroll and production departments, and places its purchase requisitions through a central purchasing department. The factory accounting departments prepare and summarize the detailed factory production figures into reports for the factory managers and the general accounting department. The latter department is responsible for comparison of actual with standard costs and analysis of variations, and compilation of data re standard and actual costs for inventory and cost of sales valuation. It is also responsible for checking and review of all costs for setting selling prices, as submitted by the factories, as well as determination of accounting policy (under the direction of the controller), and general supervision over the factory and general accounts.

The general accounting department likewise maintains the factory ledger. Under the punched card system in use this consists merely of cards and tabulated runs which show the month's transactions and the inventory balances segregated by factories, accounts, and lines of product. All purchases, sales, transfers be-

tween factory ledger accounts within a factory and between factories, and other transactions affecting factory expense and inventory accounts are punched and tabulated. Control over these transactions is maintained at the general office. Standard costs appear only on the factory ledger which is controlled by a corresponding account in the general ledger.

Material Standards

Materials (metals) as purchased are recorded at actual cost. They are then adjusted to standard cost, the difference (in the case of the more important raw materials) being credited or debited to material variance accounts which *remain a part of over-all inventory values*. A separate variation account is maintained for each such material. As the material flows from the raw state into sheet stock, work in process, and finished goods, no adjustment is made to these variance accounts which remain unchanged until the finished goods are sold. At that time the quantity of materials included in sales is computed on the basis of ratios and the material variation debited or credited to cost of sales in accordance with a method detailed later in this article. Certain minor raw materials on which purchase variations are charged or credited to cost of sales at time of purchase form the only exception to this. Materials thus remain at standard as they progress through process.

The standards used are basic standards approximating actual costs at the time they were originally set several years ago and are carried only on metals. They remain fixed regardless of price fluctuations. The factories are not concerned with actual costs but deal only in standards. Formerly, purchased parts and supplies were carried at standard costs but since these items are a small part of over-all costs and their nature is constantly changing, it was decided to eliminate these standards. At the present time it is the responsibility of the factory accountants to clear these accounts at actual cost.

Direct Labor Standards

The majority of direct labor operations in The International Silver Company factories are performed at piece work rates which are set by factory superintendents and approved by factory managers. Under these conditions actual labor (piece work) is considered standard. In the case of the operations which are done at day work rates a standard is set for cost control purposes. It

it apparent that any variations between standard and actual labor cost can be easily identified. They are caused either by variations in estimated day work rates per piece or by extra or omitted operations. Variations are charged or credited to cost of sales monthly except that profit variations are proportionately credited to inventory values (labor and burden being treated as one item for this purpose). Piece work rates are reviewed continuously and revised when necessary.

Burden Standards

Standard burden is expressed as a percentage of standard direct labor dollars. Individual operation cost centers for accumulation of burden are not used. Three factories use departmental burden rates but in other factories the products made and operations performed are uniform enough so that individual departmental burden rates are not required and two or three divisional rates in each factory suffice. For instance, in one factory producing high-grade flatware, separate burden rates are set for the making division (up to metal stock) and for the finishing division (plating and finishing).

The rates are set based on past experience, modified by a very careful study of expected variations caused by the budgeted production schedule, by elimination of extraordinary items from the previous period, changes in business conditions, etc. Rates are set by the general office cost department in conjunction with factory managers who consult and discuss with factory superintendents and foremen. When new burden rates are set they are intended to remain fixed for as long a period as possible, say two to five years. However, changes in production schedules, improvements in manufacturing methods, shifts of production between factories, etc., frequently make it necessary to revise these burden rates more often. When they are changed, if possible, this is done at the year end. Burden variations are charged or credited to cost of sales monthly. In the event of profit variations, however, calculations are made to show the portion applicable to inventories and this amount is credited to inventory values. When loss variations occur, the entire amount is charged to cost of sales.

Use Variance—Base Metals

At the rolling mill pure copper, nickel, and zinc are combined to form nickel silver; copper and zinc to form hard red brass;

silver and copper to form sterling silver; etc. Definite formulas for these alloys give the standard quantities of basic materials that should be used to make a given quantity of alloy. Variances between these figures and the actual quantities used (including dross loss) are charged off monthly in total against cost of sales.

At the fabricating factories, standard weights for sheet stock and for articles after cut-out are arrived at through engineering study and extensive tests of actual weights of new articles as they first go into production. For comparison with these standards, actual test weights of each production lot are made. Transfer from the flatware sheet stock accounts to work-in-process and scrap accounts are made at standard weights and prices from material cutting reports furnished by the factory production departments daily. Heretofore, no adjustment between actual and standard weights has been made as the differences are relatively small and they have been allowed to accumulate as an inventory adjustment at the year end. At present, the procedure is being changed so that such variation will be written off currently and not allowed to build up as a difference in the sheet stock and scrap accounts.

Use Variance—Silver

Silver, however, being a relatively expensive metal, is of necessity very carefully controlled. Anode silver used in plating is requisitioned from the silver vaults and put into the tanks. The standard amount of silver pennyweights to be plated on each article is known from charts prepared by production engineers and approved by the plating committee. As each batch is put into the tanks the plating meters are set to the required amounts. At the end of each day the total number of articles plated is multiplied by the standard plate per article to arrive at the total pennyweights used. This figure is then compared with the total shown on an integrating meter which accumulates the total silver used on all production in each tank. Thus any variation can be immediately checked.

In addition, a physical inventory of tanks is taken periodically (each month or each quarter) which, together with the opening inventory and the ounces of silver added to the tanks, gives the actual usage which can be compared, as a further check, with both the standard plate computations and the meter readings. Exhaustive checks are made to discover the reasons for any variations larger than normal plating losses. Provision is made monthly by charges to cost of sales for anticipated silver shortages.

The weights of sterling silverware which is made of 92.7 per cent solid silver must be very carefully controlled because in this ware the metal cost is a greater part of the total finished cost. Metal is ordered in production order lots in the correct gauge, width, and length. Control of the total weight of each production order is maintained on a card record. All scrap produced from each order plus the weight of the finished product obtained must equal the original metal weight less normal manufacturing losses. Practically 100 per cent tests of hollowware pieces and frequent test-weights of flatware are made to compare actual with standard weights, these test-weights being made as the product leaves the making room and again as the product is finished. There is a minor tolerance and the aim is to have the finished product at standard or slightly over standard weights. Any items overweight more than a certain percentage must be reported individually to the factory superintendent for his approval. No adjustments are made currently for variances but a record is kept and used at the year end to account for inventory differences.

Material Price Variance

Inasmuch as material costs other than sterling silver are a comparatively minor part of the total cost of the finished product, the matter of price variance is not of primary importance. A further reason for this is that most of the materials used are basic metals such as silver, copper, zinc, nickel, tin, steel, etc., which are standard materials and sold at standard prices. Hence the real concern, as far as material control is affected, is with the quantity used. Although price variances are reported currently to management for information and control purposes, the primary use of material price standards is for ease in recording transactions and for valuation of inventories and cost of sales. Moreover, since market prices are available, it is not necessary to use standard material prices in computing costs for selling prices. The material price variance accounts, therefore, are used mainly in computing the amount of variance to be charged monthly against cost of sales on a sales basis as indicated earlier and for adjusting standard inventory values to actual on an over-all basis.

Control over material price variances is maintained at the general office. Materials as purchased are vouchered and recorded in the voucher register at actual cost. In addition a supplementary

register is kept, recording the purchases by account number and showing actual cost, standard cost, variation, and weight. In this register each month's purchases are added to the opening inventory and an average actual cost arrived at, which, compared with standard, furnishes the variation to apply in costing the poundage in sales. The pounds in sales are estimated on the basis of cumulative, statistical cost information showing, by lines, the ratio of pounds or ounces of each metal to dollars of sales. Experience has shown these ratios to be accurate enough for monthly profit and loss statements. Correction of any error can be made at the year end based on physical inventories. Careful watch of the actual unit costs and the unit variations carried in inventory values is kept to see that proper charge for these variations is made to cost of sales monthly.

Direct Labor Variance

Under the wage system in use at The International Silver Company, there is neither a time nor rate variance for piece workers unless a worker cannot make his minimum guaranteed hourly wage. In that case, however, the difference is charged not as a direct labor variance but is transferred to burden as "excess direct labor cost." Such charges are very carefully followed by the factory managers and superintendents. Direct labor variances do occur, however, when operations not included in the standard are performed, or, conversely, when certain operations in the standards are eliminated in production. Variations arising from such sources are analyzed and the results presented to the factory managers for review.

In some factories standard direct labor is the product of actual quantities passing through designated points of production priced at the standard cost for that operation or group of operations. In other factories, where the manufacturing processes are more complex, the items in process diverse and numerous, and the operations substantially on piecework, actual labor is taken as standard, subject only to adjustment for extra operations actually performed which were not in the standards or operations in the standards which had been omitted in production. Back work and spoiled work allowances are then made, usually as a percentage of standard labor.

Manufacturing Statement and Cost Sheets

Burden variations, along with labor variations, are reflected in a Manufacturing Statement shown in Exhibit 1 in condensed form as to burden accounts and with year-to-date columns omitted. This statement, prepared for each division of each factory monthly, serves not only as an analysis of such variations and as a starting point for further investigation but also as an index of the operating efficiency of the factory. When unusual burden variations occur they are analyzed to determine the amount caused by volume variation, that caused by price variation, that due to the efficiency factor, etc. The manufacturing statement is used by the factory manager for control purposes and the information shown thereon is summarized in the monthly financial reports.

Referring to the manufacturing statement the first column of figures shows the base standard labor and burden which was set up at the beginning of the year (or earlier) and, with any subsequent revisions, represents expected actual production results in a normal month of 4⅓ weeks, modified by the sales and production budget which has been approved for the period. These base standards are further explained in a subsequent paragraph. The second column represents the standard labor and burden earned which is the debit to inventories for the current month's production. As indicated previously, burden is applied at the standard rate to the total standard direct labor, including the allowance for back work and spoiled work. The third column represents actual expenses for payroll, direct charge purchases, withdrawals from inventory accounts, etc. Variations appear in the fourth column and the right-hand side of the sheet, omitted from Exhibit 1, shows the cumulative figures for the year to date.

Each factory maintains a standard cost sheet or card on which is shown the detailed standard cost by operation for each article in each pattern. As labor or burden rates change they are entered on the cost card in memorandum and periodically the sheet or card is revised to incorporate all changes since the previous revision. These sheets are used in costing metal stock and finished stock transfers each month, in computing costs for selling prices, and (insofar as labor and burden costs are concerned) in valuing physical inventories at the year end. When changes in labor rates are given effect to in metal or finished stock transfers, an attempt is made to apply the new cost to production in about the same

MANUFACTURING STATEMENT
(All figures hypothetical)

Account		Base standard	Standard earned	Actual	Variation of actual from standard
		THIS MONTH			
Direct labor including tool setting	01-07	$100,000	$ 90,000	$ 90,500	$ (500)
Extra operations	03	—	*5,000	**9,500	(4,500)
Back work refinishing, etc.	08	12,500	11,900	14,000	(2,100)
Spoiled work	09	2,500	2,300	2,000	300
TOTAL DIRECT LABOR		$115,000	$109,200	$116,000	$(6,800)
Operating ratio		100%	95%	101%	
TOTAL BURDEN		$123,000	$116,800	$107,300	$ 9,500
Burden rate		107%	107%	92.5%	
TOTAL LABOR AND BURDEN		$238,000	$226,000	$223,300	$ 2,700
ANALYSIS OF BURDEN AND VARIATION BY ACCOUNTS					
Indirect labor		$ 55,600	$ 52,900	$ 46,800	$ 6,100
Supplies and utilities		$ 32,900	$ 31,110	$ 34,550	$(3,440)
Tool and die expense		$ 11,300	$ 10,740	$ 8,300	$ 2,440
Repairs and Maintenance		$ 13,800	$ 13,110	$ 11,500	$ 1,610
General expenses		$ 2,300	$ 2,200	$ 2,300	$ (100)
Spoiled work materials and merchandise		$ 2,600	$ 2,470	$ 2,300	$ 170
Fixed expenses		$ 4,500	$ 4,270	$ 4,750	$ (480)
TOTAL BURDEN		$123,000	$116,800	$110,500	$ 6,300
BURDEN TRANSFERS TO:					
Construction in Process		—	—		
Moving Expense		—	—	$ (3,000)	$ 3,000
Other Accounts		—	—	(200)	200
Total				$(3,200)	$ 3,200
NET BURDEN		$123,000	$116,800	$107,300	$ 9,500

Month of ..... Factory A ..... Division 1 .....

Signed .....
Manager

* Standard earned on operations not performed.
** Actual cost of extra operations.

EXHIBIT 1

ratio as new piece rates paid are included therein. This can only be an approximation but experience has shown that individual errors tend to offset each other so that the over-all labor and burden inventory value remains fairly accurate.

Costs for Selling Prices

The detailed cost cards or sheets are used in computing costs for the purpose of checking or setting selling prices. Material quantities shown thereon are priced at actual costs and labor and burden at standard costs, to which is added or deducted, if significant, the current percentage variation between standard and actual labor and burden. These costs, prepared by the factory cost departments and checked at the general office, are submitted to the sales division at its specific request or periodically.

Base Standards

The foregoing description of the standard costs in use by our company will indicate that material price standards included therein are so-called basic or ideal standards which do not change with price changes, and that labor and burden standards are bogey standards which are revised currently to keep up with changes in direct labor operations or costs and, more infrequently, changes in burden rates. These standards work well in providing a basis for control of costs and in computing costs for selling prices. However, they fall short in two directions, although even in these respects they may serve as well as many other standard cost systems. The frequent changes in labor and burden standards make it extremely difficult to keep all factories and the general office advised of the current standard cost of each article and this is quite important since there is a constant flow of work in process between factories which must be properly priced at whatever location or stage of completion. In addition, the standards do not provide an easy means of costing sales and therefore some method must be found which will eliminate the necessity of costing individual invoices or of summarizing quantities and pricing totals at each month end.

To overcome these difficulties there have been established so-called "base standards" or "base prices" which are in effect standards of measurement or indices used to measure variations in cost. These base standards are perhaps the most distinguishing feature of The International Silver Company cost system. They change

as the goods move through process to finished goods. Relationship of these yardsticks (base standards) to standard and actual costs is maintained by means of ratios built up cumulatively from each month's transactions. Exhibit 2 shows in a simplified way the development of these ratios and the flow of goods through process.

It will be noted that the base standards or indices are different for raw material, the various process stages, and finished product. In the case of raw material it is pounds or ounces of material, for work-in-process material a fixed price per pound, for work-in-process labor and burden the standard cost of labor and burden, for metal stock a metal list price, for finished stock a list price (or base price in case the line is not sold on the basis of list prices). In contrast to these indices, the standard cost of the article is a continuous, cumulative cost, building up to the final standard cost of the finished article. All purchases of material and factory transactions are expressed in both media so that ratios for conversion from one base to the other are available at all times.

Costing Sales

Let us see how these base prices work, first in the costing of sales, as that may be the best example. Much of our product is sold by lines on the basis of list prices with net selling prices expressed as a certain discount or series of discounts from list. In the case of finished goods the base standard or index of measurement is thus list prices or (where lines are sold on a net basis) net selling prices. All transactions affecting finished goods are expressed both at base standard and standard cost. The ratio between the two is thus established. If we can then express our net sales in terms of list prices we have the means of finding the standard cost of net sales. This is done, in total by lines, as follows:

Sales invoices are coded individually to indicate the discount allowed from the basic list or net price used in pricing finished production. This information is punched on a tabulating card. In tabulating, all invoices with the same discount code in each line are totalled. Conversion from net selling price to list price is done in total by discount codes, each code representing a certain percentage discount. Once having obtained the total list price for each line's sales, the ratio of list to standard cost of finished goods is applied, resulting in standard cost of sales. In the event of price changes a new base may be required and this will result

(All Figures Hypothetical)

Inventory Change and Development of Ratios Between Standard Cost and Base Standard Prices

	Base std. unit of measurement	Inventory at beginning			Purchases, payroll, etc.				Transfers to work in process			Transfers to metal stock, *finished stock and cost of sales			Inventory at end		
		Std. cost	Ratio	Base std.	Std. cost	Ratio	Base std.		Std. cost	Ratio	Base std.	Std. cost	Ratio	Base std.	Std. cost	Ratio	Base std.
Nickel silver scrap	Cents per lb.	1,200	86.	1,400				(a)	700	95.	735				1,900	89.	2,135
Nickel silver sheet stock	Cents per lb.	20,000	95.	21,000	2,250	102.	2,205	(a)	(2,116)	96.	(2,205)				20,134	96.	21,000
Labor					10,500			(b)	(10,500)								
Supplies					3,000			(b)	(3,000)								
Other expense					3,000			(b)	(3,000)								
Work in process																	
L & B—Making	Std. cost	10,000	100.	10,000				(c)	(1,000)								
								(b)	11,000		10,000	(10,000)		(10,000)	10,000	100.	10,000
L & B—Finishing	Std. cost	5,000	100.	5,000				(c)	(500)								
								(b)	5,500		5,000	*(5,000)		(5,000)	5,000	100.	5,000
Material	Cents per lb.	6,000	86.	7,000				(a)	1,416	96.	1,470	(1,287)	88.	(1,470)	6,129	88.	7,000
Silver	Cents per oz.	1,000	50.	2,000	5,000	50.	10,000					*(1,000)	50.	(2,000)	5,000	50.	10,000
Metal stock	$ per gross	15,000	125.	12,000								11,287	125.	9,000	16,262	125.	13,000
												(10,025)	125.	(8,000)			
Finished stock	$ per dozen	2,500	53.	4,717								*16,025	49.	32,333	5,645	50.	11,290
									Cost of sales at standard			(12,880)	50.	(25,760)			
Total inventory at standard		60,700			23,750				(1,500)			(12,880)			70,070		
Material variance accounts		4,000			3,150							(2,000)			5,150		
L & B variance accounts		..						(c)	1,500			(1,500)			..		
Inventory at actual		64,700			26,900				Cost of sales at actual			(16,380)			75,220		

Exhibit 2

in an adjustment in the ratios between the base price and the standard cost of finished goods which must be considered before ratios can be used.

Controlling Work in Process Inventory

Base standards also find a use in controlling work in process inventory values. We have seen how changes and improvements in manufacturing methods affect labor and burden costs and how the constant flow of work in process between factories renders control over costs extremely difficult. By providing an unchanging or base standard for use by the factories in all interfactory and intrafactory transfers of any material and maintaining a ratio between these standards and standard costs we make it easy for the factories to record transactions affecting work in process and at the same time the general accounting department can control and properly value these transactions and the resulting inventory balances.

The same is true of metal stock, that intermediate stage in production where the article is finished in metal and requires only plating and buffing before it is a completed article. A metal list value is established for each article in the line and standard costs are related to these metal list prices. The inventory balances in metal stock account can be adjusted to equivalent current production cost by the simple means of making the ratio of inventory to base prices agree with that of current production to base prices, charging off the difference to cost of sales. Assuming that physical inventory at the year end is valued at current cost of production this procedure guarantees that there will not be any large inventory price difference in the book figures. Control exercised over metal stock and finished stock is by line of product, that over work in process by account.

Physical Inventory Valuation

Physical inventories are taken annually as of the end of the calendar year. Pricing is done by the factories at base standard costs which are first converted to actual to obtain actual inventory cost for financial statement purposes and are then converted to standard for the purpose of opening the factory ledger for the new year. Conversion rates to apply to base standard costs to obtain actual and standard are built up from actual figures for ten months of the year.

Sales Forecast and Production Budget

Toward the close of each year the controller requests the sales division for an estimate of sales for the ensuing year by lines of product. Upon receipt of this information, which is based on individual estimates by line managers tempered by the sales manager's judgment, the production control department translates the sales dollars into production quantities. These quantities are then discussed with the production division and revised where necessary. The final production budget quantities are reported to the individual factories and all production orders issued must conform to the over-all production budget. The production control department acts as a watchdog on inventory quantities at various stages of production and reports to management as required. Ordinarily, since ours is a seasonal business, inventory builds up during the first part of the year and is reduced during the latter part.

Conclusion

I have attempted to touch on the salient points of the standard cost system in use at The International Silver Company. It is not perfect. No system is. It does not permit as close control over separate elements of costs as might be desirable in the later stages of production but controls only in total by ratios. It permits computation of cost of sales in total by lines only and not by individual patterns or items. It does not permit detailed comparison of actual performance of direct labor against standard since performance is standard except for deviation from prescribed manufacturing processes. However, comparisons of labor prices can be made between different articles, with prior periods, and with other factories and only a minimum of effort is required to obtain the standard labor value of production. Burden rates can be changed as required without seriously upsetting book inventory values. Material standards are set at ideal or basic standards which makes comparisons by accounts between periods easy and yet over-all inventory values are easily controlled through the variance accounts. The system as it is operating furnishes a basis for control of costs, enables us very readily to compute costs for selling prices, provides an adequate basis of valuation of book inventory throughout the year and physical inventory at the year end, and aids in the preparation of budgets and forecasts. For us it has worked well.

AN ORDER COST SYSTEM UNDER BUDGETARY CONTROL

by J. C. FREEMAN, General Works Accountant,
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ANY BUSINESS not eternally consigned to bankruptcy must plan and this planning stems from a budget or forecast of its operations, and budgeting or forecasting is not, it seems to me, a sole prerogative of standard costs. The latter carries as its distinguishing feature a characteristic adaptation of the basic requirements for reporting and valuation purposes, whether of order or process costs, inventories, cost of sales, etc. The tools of control, on the other hand, about which standard cost systems are built antedate the birth of standard costs by decades. They are tools of control under an actual costs system as well and include drawings, bills of materials, time and motion studies, and expense control. Either system may be integrated with a production control system.

Either may be shaped to render broad service to business with respect to its principal objectives which are, and will remain, to maximize sales and revenue, to minimize costs, and to maximize profits. To aid in the achievement of this end by accurate, complete, and revealing reports to management, the accountant by his profession has dedicated his talents.

Serviceability for Cost Control the Basis of Choice

The decision of an accountant to adopt one system in preference to another is reduced in the last analysis to the method of control of costs best suited to the needs of his particular enterprise. Cost control finds its epitome in cost analysis and comparison with some pre-established norm, although this need not necessarily be dollars. Control should be more concerned with pounds of material and hours of labor and reaches its highest point not when comparisons are made on an order or departmental basis but rather when such comparisons are made on a material item or labor operation basis.

It is accepted as a mandate that the cost accountant should build a cost system which will produce accurate results and that prior thereto, in concert with his engineering and manufacturing organization, he should have drafted a master plan against which accu-

rate results may be beneficially compared. The better a product is engineered, the better it will be manufactured and the better it will be costed.

Scope of Budgeting

The operations of our company are controlled by a master budget, in complete detail. We compile a sales forecast and forecast the profit and loss statement and closing balance sheet as well, and establish a cash budget, a budget of the several elements of manufacturing cost, and a budget for administrative and distribution expense and taxes. These result in what we call a profitgraph. All these forecasts, budgets, or projections are set off for each month or accounting period, and cumulatively, against the actual happenings of the business. The operations reflected and controlled are numerous and diverse. Allis-Chalmers has 29,000 employees, eight works, and one hundred and twenty-six district, branch, export, and foreign offices. The products made number 1,600, from an item which can be held in the palm of the hand to one which requires the services of a 100-ton crane to move.

The company is celebrating its centenary this year and its use of actual order costs, with the firm bases of budgetary control indicated, has satisfied. This paper is written to present the control methods in use in some detail and as a tip-off to our viewpoint it might be mentioned at the start that cost control begins with the engineering of products and considers the functions of the enginering departments at all times.

Construction and Use of Predetermined Costs

We subscribe to the premise that for cost control for managerial purposes there must be cost analysis and comparison with preestablished norms, call them standards if you will. These predeterminations are made in our company in two ways. The first is an over-all plan or estimate of costs on contracts of $5,000 and over. The second consists of a detail planning of the several elements of works cost. In this planning we are interested in the selling price and the gamut of costs, engineering, patterns, tools, special development, manufacturing, material, labor and works expense by manufacturing order, subcontracting, transportation, royalty, erection, standard development and research, miscellaneous manufacturing expense, and commercial expenses.

There is company-wide recognition of the estimating procedure and its results. The estimates made are inductive estimates built progressively from material cost through to profit, taking full cognizance of existing company facilities. In the event that the estimates do not reveal a satisfactory margin, the detail drawings, bills of material, and manufacturing facilities and processes are studied by the sales, engineering, manufacturing, and comptroller's divisions to determine whether economies can be effected to reduce costs. Upon completion of each order, actual costs are furnished for each of the items estimated and a comparison is made of the estimate and the actual costs. Copies of these reports are made available to the vice president and comptroller, the vice president in charge of manufacturing, the vice president in charge of sales, the product department manager, and the works accountant. These estimates with comparisons, prepared by each participating product department, are further consolidated on a summary statement for each completed contract and show estimated and actual costs apportioned to each participating department.

Our cost control procedures reach still further down into the manufacturing processes themselves. The drawings and bills of material originating in the engineering department are set up with cost control in mind and their progress through the planning and scheduling departments, manufacturing centers, and works accounting department is all under systematic control and results in detail reports of costs to the product departments.

Order Processing: The Planning Phase

In the typical processing of an order in our company, the drawings and bills of materials are prepared by the engineering department and forwarded to the planning department. Cost control has already begun in the very act of design engineering. If maximum profit is to be assured, the engineer must be early acquainted with the chain of cost events. Failing in this the product may be over-engineered and the work becomes a testimonial to engineering pride rather than a means toward profitable operation. In the selection of material and its conversion as exemplified by the drawings, the die of cost control is, as it were, already cast. Cost consciousness is the life blood of an organization and should flow through all of the organizational members, if atrophication, withering, or impotency is to be avoided. It can be axiomatically declared that without production control there can be no assured

cost control. At this preproduction stage of the production cycle, a sharp distinction must be drawn between products which are regular and those which are special. The engineering of the first carries relatively permanent benefit if cost saving is effected. In respect of the second type, by reason of its special nature, a one-time usage only is planned with no future possibility of cost savings.

In the engineering, manufacturing, and costing of a product, there must be a logical progression from the component parts through the subassembly and major assembly stages, culminating in the finished machine. The design in the engineer's mind must, whether initially or ultimately, find its final expression in an assembly drawing and bill of materials, complete in detail as to quantity, origin, rough and finished weight, description, and size. We take advantage of the basic information so provided. The completed drawings and bills of materials are transmitted to the planning section of the production control department, where the process engineer develops process specifications for parts, subassemblies, assemblies, and the finished product.

These specifications, known as routing analyses, conjoin the bill of materials as furnished by the engineering department along with time and motion studies as required by the drawings. The routing analyses contain complete prospective production detail. They specify the quantity, production center, operation numbers, machine designations, the planned time (per piece and setup), number of men required, description of operations, feed, speed, tool number, and tool location. This planning is further elaborated to include alternative plans.

Order Processing: The Production Phase

At this point we stand at the threshold between planning and action. Action becomes incarnate in the transmission of the plan to the scheduling section where the order is assigned a date for the commencement of manufacturing operations and the routing analysis is mechanically duplicated in the form of a work order. At the same time and also using the routing analysis as the duplicating source, a cost and estimating form and material and labor requisitions—reflecting the routing analysis line for line—are made. Thus, production control plan as a whole provides an indelible chain of events marking the company's activities with respect to each order from design and bill of materials to process

specifications complete as to material items and labor operations immediately identifiable with the cost and estimating form, the costing medium of the works accounting department. The cost and estimating form makes provision for the estimated costing of the order as well as the reporting of the cost actually incurred, to yield the order estimates and comparisons previously indicated as in use.

Earlier in the discussion the observation was made that there is no essential difference in the engineering, production, and costing of a product whether the cost system be actual or standard. If this is so it cannot then be claimed that standard costs alone are planned or predetermined costs because related control features are common to both and therefore distinguish neither.

Control of Works Costs

As set forth earlier in this presentation specific order cost control is supplemented by application of control devices to works costs. Here it will be observed that we work against results which we feel should be achieved but that our control media are of various sorts, deemed appropriate for various purposes, and that figures used are not necessarily carried through to dollar equivalents. The procedures in force are considered separately under the conventional divisions of material, labor, and works expense.

Accounting for Excess Material and Labor Costs

Planning is control. Lack of planning is chaos. The presumption is that the work of the design and process engineer results in a mandate to the production department, although infallibility is naturally not a prerogative of a process or planning engineer. It is provided in our system that material requisitions are firm and that withdrawals in excess of planned material requirements as shown by the routing analysis may not be made except by the use of an excess ticket, identifiable by color and punching, individually prepared. These excess tickets are processed in the normal fashion except that, prior to their inclusion in the inventory entries, they are tabulated by production center, order number, pounds of material, and value. Copies of the tabulated report are made available to the planning and scheduling sections, the production center, and the engineering and works accounting departments. It forms

a factual basis for remedial action either in a reworking or modification of the product or a functional correction in the operating department.

Divergencies thus disclosed and acted upon, whether or not reduced to dollars, are kindred to the usage variances of a standard cost plan. However, because they are not charged off we feel we avoid the policy of writing off, as variances, items of cost which are properly product costs of inventory retained for sale in a subsequent period.

The source material for the accumulation, analysis, and control of labor costs is identical with that of material, namely, the routing anaylsis. The system, as with material usage, provides that labor requisitions are firm and that labor time or operations in excess of planned may not be authorized except by an excess ticket, separately prepared and distinguished by color and identifying punching. Upon completion of the order and before inclusion in inventory, a report of such unplanned costs is tabulated and distributed to the planning and scheduling sections, the production center, the engineering and works accounting departments. Upon determination of the responsibility for variations from the plan the amount of these variations, if the plan is determined to be correct, is charged as a factory overhead expense to the department. This is done in adherence to the budget principle that where there is authority there is the related responsibility also.

Works Expense Application and Budgeting

Departmental overhead or works expense is assessed against orders on the basis of direct labor and is controlled through the use of a variable budget. In the use of this term we recognize a difference between those expenses which are fixed and to all intents and purposes uncontrollable and those which are variable and bear a direct relation to the volume of production and direct labor. The budget of manufacturing expenses for the ensuing year is based on past experiences adjusted to meet anticipated expenses. The foreman is brought into the discussions at an early stage because ultimately it is his budget and its fulfillment rests directly in his hands. Past experience is a guide post not a hitching post in the determination of volume of production anticipated, amount of direct labor required, and the necessary complement of supervision, indirect labor, maintenance and repairs, supplies, and general expenses.

These early determinations are subject to review by the superintendents and works managers and as finally arrived at works expense budget allowances are based on determination of normal capacity for direct or producing departments and normal expenses for that capacity. An overhead rate, composed of a fixed and variable element, is determined and analyzed each month. Except for major reasons the rate so established is not adjusted oftener than once each year. At the end of each month the total actual expenses and the total burden applied to direct labor at the predetermined rate is compared and the difference charged or credited to the over- and underabsorbed burden account, and adjusted, productwise, to cost of sales.

Establishment of a budget is a proper first step, but control depends on accurate and revealing reporting. Departmental expenses should naturally be reported directly to the foreman for each calendar week. He should be able from the report to compare quickly for the week and the year to date (1) actual direct labor with budgeted direct labor, (2) each classification of expense with the budgeted amount, (3) the per cent which each bears to direct labor, and (4) the per cent of budget realization.

Striving for Cost Reduction

Satisfactory relationship between budgeted and actual figures is not the ultimate of budgeting. Reduction of expenses is even more to be desired and this can be determined by only searching scrutiny of the composition of the charges. Some helpful hints, indicating the outlook in our company on this point, are made a part of this discussion under the following topical headings:

1. *Labor*—Careful analysis of this account would prescribe the advisability of listings of personnel so that periodic scrutiny may be made to determine whether the continuation of the expense is required. Consolidation and elimination of functions offer possibilities of expense reduction.
2. *Maintenance and repairs*—There is no wisdom in postponing maintenance and repairs to buildings, machinery, and equipment. When repairs are needed they should be made. Otherwise, what began as a minor repair may lead to a complete machine breakdown with resultant increased charges. A department whose equipment is kept in good repair will experience a low maintenance and re-

pair cost, lower defective material and labor, and consequently will require less indirect labor and supplies.

3. *Supplies*—Increased production results in the use of an increased quantity of supplies but should not distort a good operating ratio. There is, however, both an economical and a statistical value in requisitioning supplies on a weekly basis—economical from the standpoint of less handling and statistical from the standpoint of weekly comparisons on a volume basis.

4. *Defective material and workmanship*—The foreman is admonished to study the charges against the defective material and workmanship account in the light of removing the causes so that a repetition of the expense may be avoided. This expense can be reduced by maintaining machinery and tools in good operating conditions, by good supervision and instruction of employees, and by improvement of methods.

5. *Summary departmental and divisional budgets*—A summary is made of all departmental budgets for the superintendent's notice. Summary budgets are prepared by departments as well as by type of expense so that by easy cross reference budget exceptions may be noted. Divisional budgets are a grouping of the summary departmental budgets, both by department and type of expense, and by line of authority and responsibility.

6. *Manufacturing quantities*—One particular factor of usage is manufacturing quantities. There perhaps is no one single factor in the conversion process which is more overlooked than the fact that there are certain fixed charges such as direct setup costs, transportation costs, and accounting costs, which may be minimized if critically examined in the light of economical quantities.

Conclusion

From the material presented, it may be observed that, given a planned approach, an order cost system is well able to employ budgetary and analytical tools for controls. I can see distinct value in the installation of a standard cost system in certain types of business. However, the facility with which it dispenses with the use of individual material and labor requisitions and order cost

accumulation, the disposition of all variances as period costs, and the inclusion of standard costs and variances in the books of account are but a few of the particular features of the system which appear to me to be difficult, if they can be proven advisable, to adapt in a nonstandard enterprise. Finally, the history of a company, whether expressed in the part, subassembly, or assembly cost, the cost of sales, the profit and loss statement, or the balance sheet must ultimately be reduced to what actually happened. The intermediate steps are a matter of judgment on the part of the accountant.

Another factor to be considered is that of multi-process manufacturing centers. Do adherents of the standard cost system at all costs go so far as to advocate discontinuance of the job order method of cost accumulation in cases in which more than one type of unit or product is processed through the same production center? Some writers on the subject offer the suggestion that production centers should be reduced in size so that only like items are processed. However, sometimes the composition of manufacturing centers is such that this cannot be done. The day may come, but from all evidences not in the foreseeable future, when the varied-product lines or more complicated businesses may relinquish the order type of cost accumulation, but that day must await a thorough reconversion of manufacturing processes and production center composition.

I concur with the adherents of a standard cost system in the basic elements of control. It is in the usage of such elements that I part company. I subscribe to the premise that an important function of cost accounting is to record costs and to allocate them properly to the revenues derived from them and to the periods to which they relate. Actual costs, in my opinion, offer the best means of validating that premise.